

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-234224

(43)Date of publication of application : 27.08.1999

(51)Int.Cl.

H04H 1/00

H04B 1/16

(21)Application number : 10-029916

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(22)Date of filing : 12.02.1998

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(54) RECEIVER FOR DIGITAL AUDIO BROADCASTING

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a receiver for digital audio broadcasting with which the time for visually confirming the desired audio program and displaying data can be shortened.

SOLUTION: Concerning the receiver for digital audio broadcasting for receiving the broadcasting to which a plurality of audio services are multiplexed and multicarrier modulation is performed, this receiver is provided with an FIC decode part 52 for extracting FIC information, which is located at the header of data frames of the plurality of audio services, containing the control data of services, FIC analytic part 111. for analyzing control data and finding the program information of services contained in the control data, storage part 12 for registering the program information as a registered program, display operating part 14 for displaying the program information in order to select the desired program and outputting a registering instruction so as to define the desired program as the registered program, and control part 11 for receiving the registering instruction from the display operating part to the desired program, registering the program information provided by the FIC analytic part into the storage part, retrieving the registered program out of the programs of plural services received at present and outputting a program corresponding to the retrieved registered program.

LEGAL STATUS

[Date of request for examination]

08.03.2001

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3636419

[Date of registration] 14.01.2005

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

CLAIMS

[Claim(s)]

[Claim 1] In the receiver of the digital audio broadcast which receives the broadcast to which service of two or more audios was multiplexed and the multi-carrier modulation was carried out The FIC decoding section which extracts the FIC information which is located in the header of the data frame of service of two or more of said audios, and contains the control data of said service, The FIC analysis section which searches for the program information on said service which analyzes said control data obtained from said FIC decoding section, and is included in said control data, The display control unit which outputs registration directions that said program information should be displayed as the storage section for registering said program information as a registration program in order to choose a desired program, and a registration program should be carried out to a favorite program, The program information acquired from said display control unit in said FIC analysis section in response to the registration directions to said favorite program is made to register into said storage section. The receiver of the digital audio broadcast characterized by having the control section to which the program corresponding to the registration program which searched the registration program with the program of two or more services which are carrying out current reception, and was searched with it is made to output.

[Claim 2] Furthermore, it is the receiver of a digital audio broadcast according to claim 1 which has the advice sound formation section which forms an advice sound, and is characterized by said control section making an advice sound output

simultaneously through said advice formation section if output initiation of the program corresponding to a registration program is carried out.

[Claim 3] Said control section is a receiver of a digital audio broadcast according to claim 2 by which it is performing output authorization [of said advice sound], or control of prohibition characterized.

[Claim 4] Said control section is a receiver of a digital audio broadcast according to claim 1 characterized by performing output authorization of the program corresponding to a registration program, or control of prohibition.

[Claim 5] It is the receiver of a digital audio broadcast according to claim 1 which said storage section is made to memorize priority with these when said display control unit has two or more registration programs of this time of day, and is characterized by said control section making the program corresponding to the higher one of priority output.

[Claim 6] Said control section is a receiver of a digital audio broadcast according to claim 5 characterized by performing control of the output authorization based on priority, or prohibition.

[Claim 7] Said control section is a receiver of a digital audio broadcast according to claim 1 characterized by returning to the original program when the program corresponding to a registration program is completed, before outputting the program corresponding to a registration program.

[Claim 8] It is characterized by said control section performing control which permits returning to the original program and is forbidden at the time of termination of the program corresponding to a registration program. The receiver of a digital audio broadcast according to claim 7.

[Claim 9] Said control section is a receiver of a digital audio broadcast according to claim 1 characterized by performing control which resets the registration program registered into said storage section.

[Claim 10] In the receiver of the digital audio broadcast which receives the broadcast to which service of two or more audios was multiplexed and the multi-carrier modulation was carried out The FIC decoding section which extracts the FIC information which is located in the header of the data frame of service of two or more of said audios, and contains the control data of said service, The FIC analysis section which searches for the program information which analyzes said control data obtained from said FIC decoding section, and is included in said control data, The PAD analysis section which asks for the TOPICS which analyzes the PAD information which contains the data relevant to audio data along with each audio data of two or more subchannels following the FIC information on the data frame of service of two or more of said audios, and is contained in PAD information, The topic obtained in the program information acquired in said FIC analysis section, and said PAD analysis section, The display control unit which makes said storage section memorize the topic which sorted the topic memorized by the storage section and said storage section for

memorizing the frequency of occurrence of a topic with the frequency of occurrence in a fixed time span, displayed, and was sorted, The control section to which the program of the topic which corresponds in searching the topic memorized and sorted by said storage section in the topic obtained from the program of two or more services which are carrying out current reception from said PAD analysis section and being in agreement with the topic of a high order is made to output The receiver of the digital audio broadcast characterized by having.

[Claim 11] Said control section is a receiver of a digital audio broadcast according to claim 10 characterized by outputting the program corresponding to the topic like a sort order higher when the topic memorized and sorted by said storage section in the topic obtained from the program of two or more services which are carrying out current reception from said PAD analysis section is searched and two or more topics of a high order are in agreement.

[Claim 12] Said control section is a receiver of a digital audio broadcast according to claim 11 characterized by performing output authorization of the program corresponding to the topic like said sort order, or control of prohibition.

[Claim 13] Said time span is a receiver of a digital audio broadcast according to claim 12 characterized by being set as arbitration from the exterior.

[Claim 14] Said display control unit is a receiver of a digital audio broadcast according to claim 10 characterized by setting the ranking threshold of the frequency of occurrence for extracting from the sorted topic to the topic of a high order as arbitration from the exterior.

[Claim 15] Furthermore, it is the receiver of a digital audio broadcast according to claim 10 which has the advice sound formation section which forms an advice sound, and is characterized by said control section making an advice sound output simultaneously through said advice formation section if output initiation of the program corresponding to said topic memorized and sorted is carried out.

[Claim 16] Said control section is a receiver of a digital audio broadcast according to claim 15 by which it is performing-output authorization [of said advice sound], or control of prohibition characterized.

[Claim 17] Said control section is a receiver of a digital audio broadcast according to claim 10 characterized by performing output authorization of the program corresponding to said topic memorized and sorted, or control of prohibition.

[Claim 18] Said control section is a receiver of a digital audio broadcast according to claim 10 characterized by returning the original program when the program corresponding to said topic memorized and sorted is completed, before outputting said corresponding program.

[Claim 19] It is characterized by said control section performing control which permits returning to the original program and is forbidden at the time of termination of the program corresponding to said topic memorized and sorted. The receiver of a digital audio broadcast according to claim 18.

[Claim 20] Said control section is a receiver of a digital audio broadcast according to claim 10 characterized by performing control which resets said topic memorized and sorted.

[Claim 21] Said storage section memorizes the topic obtained in the program information acquired in said FIC analysis section for two or more services of every, and said PAD analysis section. Said display control unit sorts a topic with the frequency of occurrence of a topic for two or more services of every. It is characterized by said control section making the program of the topic which corresponds when the topic memorized and sorted by said storage section in the topic obtained from the PAD analysis section for two or more services of every is searched and the topic of a high order is in agreement output. The receiver of a digital audio broadcast according to claim 10.

[Claim 22] Said control section is a receiver of a digital audio broadcast according to claim 21 characterized by making the program of the topic like a sort order higher when the topic memorized and sorted by said storage section in the topic obtained from said PAD analysis section for two or more services of every is searched and two or more topics of a high order are in agreement output.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention utilizes the service data offered by especially the digital audio broadcast about the receiver of a digital audio broadcast (DAB) suitable for migration reception, and relates to the receiver which can sponsor the program treating a favorite program or the latest topic by easy actuation.

[0002]

[Description of the Prior Art] There are some which adopt an orthogonal frequency division multiplex method (OFDM) as a receiver of the above-mentioned digital audio broadcast. In a digital audio broadcast, in order to multiplex two or more voice programs, a multi-carrier modulation is performed. It is possible to choose and hear one favorite voice program from two or more voice programs transmitted by package in the receiver. In this case, it is possible to switch a voice program one by one, to hear it, and to choose a favorite thing like the usual radio set.

[0003] In the receiver of a digital audio broadcast, the data which explain a voice program with a voice program are also transmitted further. It is possible to display this data, to see this and to choose one voice program from this inside directly, without hearing a voice program. As compared with the example which chooses and

hears a voice program as mentioned above, a voice program is not heard one by one, but since ** is also good, it is advantageous in respect of compaction of time amount. [0004]

[Problem(s) to be Solved by the Invention] However, in the example which looks at data display directly and a voice program chooses, it must judge from a display how the thing of liking [a voice program] is. If the content of the voice program cannot be judged from this display, there is a problem that it must switch to a voice program and compaction of time amount can seldom be expected after all.

[0005] Furthermore, although a display must be seen in the decision from data display, in the activity of a mobile like an automobile, the shorter one of the check-by-looking time amount of data display is desirable. therefore, this invention -- a favorite voice program -- a short time -- and the check-by-looking time amount of data display aims at offering the receiver of a short digital audio broadcast.

[0006]

[Means for Solving the Problem] In the receiver of the digital audio broadcast which receives the broadcast to which service of two or more audios was multiplexed and the multi-carrier modulation was carried out in order that this invention might solve said trouble The FIC decoding section which extracts the FIC information which is located in the header of the data frame of service of two or more of said audios, and contains the control data of said service, The FIC analysis section which searches for the program information on said service which analyzes said control data obtained from said FIC decoding section, and is included in said control data, The display control unit which outputs registration directions that said program information should be displayed as the storage section for registering said program information as a registration program in order to choose a desired program, and a registration program should be carried out to a favorite program, The program information acquired from said display control unit in said FIC analysis section in response to the registration directions to said favorite program is made to register into said storage section. The receiver of the digital audio broadcast characterized by having the control section to which the program corresponding to the registration program which searched the registration program with the program of two or more services which are carrying out current reception, and was searched with it is made to output is offered. Using the program information included in FIC information, a favorite program came to be acquired automatically, actuation became very easy, and this means enabled it to attain the early object.

[0007] Moreover, this invention is set to the receiver of the digital audio broadcast which receives the broadcast to which service of two or more audios was multiplexed and the multi-carrier modulation was carried out. The FIC decoding section which extracts the FIC information which is located in the header of the data frame of service of two or more of said audios, and contains the control data of said service, The FIC analysis section which searches for the program information which analyzes

said control data obtained from said FIC decoding section, and is included in said control data, The PAD analysis section which asks for the TOPICS which analyzes the PAD information which contains the data relevant to audio data along with each audio data of two or more subchannels following the FIC information on the data frame of service of two or more of said audios, and is contained in PAD information, The topic obtained in the program information acquired in said FIC analysis section and said PAD analysis section is memorized. With the frequency of occurrence of a topic The sort of a topic, The display control unit which makes said storage section memorize the topic which sorted the topic memorized by the storage section and said storage section for memorizing the frequency of occurrence of a topic with the frequency of occurrence in a fixed time span, displayed, and was sorted, The control section to which the program of the topic which corresponds in searching the topic memorized and sorted by said storage section in the topic obtained from the program of two or more services which are carrying out current reception from said PAD analysis section and being in agreement with the topic of a high order is made to output The receiver of the digital audio broadcast characterized by having is offered. A program with the high frequency of occurrence of the topic of the program included in PAD information by this means can be automatically acquired now, and it becomes possible to get to know what is top information now.

[0008]

[Embodiment of the Invention] The gestalt of operation of this invention is explained with reference to a drawing below. Drawing 1 is drawing explaining the receiver of the digital audio broadcast concerning this invention. As shown in this Fig., the receiver of the digital audio broadcast of an orthogonal frequency division multiplex method (OFDM) the radio-frequency head (RF) which is connected to the antenna 1 which receives a digital audio broadcast, and an antenna 1, performs the down convert of the transmit frequencies of an input signal, changes into baseband, and chooses one ensemble of arbitration from two or more ensemble -- two -- A/D converter 3 (Analog to Digital Converter) which is connected to a radio-frequency head 2 and changes an analog signal into a digital signal, The recovery section 4 which gets over by connecting with A/D converter 3 and carrying out the fast Fourier transform of the digital signal, The channel decoding section 5 which performs DEKODO of the data obtained from the recovery section 4, and chooses one channel of arbitration from the channel of two or more services, The audio decoding section 6 which decodes the audio data compressed about the channel chosen in the channel decoding section 5, D/A converter 7 (Digital to Analog Converter) which is connected to the audio decoding section 6 and changes a digital signal into an analog signal The adder unit 8 adding the beep sound signal later mentioned to the output signal of D/A converter 7, the power amplification 9 which amplifies the output signal of an adder unit 8, and the loudspeaker 10 which is connected to power amplification 9 and reproduces a sound signal in a sound are provided.

[0009] The FIC decoding section 52 which decodes the data of FIC (high-speed information channel) which exists in the header of the data obtained from decoding/selection section 51 which decodes an error correction etc. in the channel decoding section 5 as decoding of the data obtained from the recovery section 4, and chooses service of one channel of arbitration from the channel of two or more services, and the recovery section 4 is formed.

[0010] A control section 11 is a microcomputer and the FIC analysis section 111 which analyzes the data from the FIC decoding section 52 to this, and identifies service etc., and the PAD analysis section 112 which analyzes the PAD information (program associated data) included in the data decoded in decoding/selection section 51, and identifies a topic are formed. A control section 11 performs control to which one channel of arbitration is made to choose it as decoding/selection section 51, and performs control to which one ensemble of arbitration is made to choose it as a radio-frequency head 2 further.

[0011] The storage section 12 memorizes the result which consisted of RAM (Random Access Memory) and was obtained in the FIC analysis section 111 of a control section 11, and PAD analysis section 112 grade. The beep sound formation section 13 adds a beep sound signal to an adder unit 8, and outputs a beep sound from a loudspeaker 10. Although a control section 11 mentions later, if the favorite program is broadcast, it will perform control which makes a beep sound output to the beep sound formation section 13, for example.

[0012] The display control unit 14 performs display and actuation, as a user can perform actuation of selection of ensemble, and selection of service, setting-out actuation of the selection condition of a favorite program, etc. based on the output of the FIC analysis section 111 of a control section 11, and PAD analysis section 112 grade. Drawing 2 is drawing explaining the example of actuation of selection of the ensemble in the display control unit 14. As shown in this Fig., before reception, manual operation buttons A, B, C, and D are displayed on the selection display of the ensemble of the display control unit 14. One manual operation button of arbitration, for example, manual operation button B, is pushed by the touch switch, and selection of ensemble is performed. In this case, manual operation button B is displayed brightly and other manual operation buttons are displayed darkly.

[0013] Drawing 3 is drawing explaining the example of actuation of selection of the service in the display control unit 14. If the progressing carbon button of the lower part of a display screen is pushed after ensemble setting out by the display control unit 14, the selection display of the service shown in this Fig. will be performed. For example, it indicates that it can sponsor the program of radio station a, radio station b, radio station c, radio station d, radio station e, and radio station f as a class of service included in the selected ensemble B. The user is selectable by the touch switch in service of one radio station of the arbitration out of these. Furthermore, the information on the program of a radio station heard now is memorized by the storage

section 12 by pushing the carbon button of program registration of a radio station.

[0014] Drawing 4 is drawing explaining the ensemble received. As shown in this Fig., as for ensemble, in a 190-230MHz band or a 1452-1492MHz band, Ensemble A, B, C, and D is formed as an example, and these correspond to A, B, C, and D of a manual operation button. Each ensemble is located in fixed frequency spacing, and is constituted from many become irregular multi-carriers by one symbol which has a 1.5MHz band in each ensemble.

[0015] Drawing 5 is drawing showing the related example of the service and the data frame of a digital audio broadcast. As shown in this Fig., service of radio station a, radio station b, radio station c, etc. is included in one ensemble B as two or more services. At least one or more service components are contained in each service, and when it is this Fig., audio a', data b', TMCE', and ** are contained in radio station a as a service component. For example, data b' is data of a weather report etc. here, and TMC is data of a traffic message (traffic congestion) channel. In addition, it is displayed on the display control unit 14 as data b' and TMCE'.

[0016] moreover -- a radio station -- b -- **** -- service -- a component --
***** -- an audio -- a -- ' -- or -- b -- ' -- data -- b -- ' -- TMCE' -- ' --
containing -- having . Audio d' and TMCE' are contained in radio station c as a
service component. It is the same about other radio stations (abbreviation). Next, the
data frame of a digital audio broadcast possesses MSC (the main service channel)
after that with FIC (high-speed information channel) in a header. FIC has a layered
structure and it consists of two or more FIB (high-speed information block), and the
data field of FIB consists of two or more FIG (high-speed information group), and FIG
consists of a header and a FIG data field. The array of time amount, a date, a type, a
label, and data, traffic message (TMC) control, etc. are included in this FIG data field.
The identifying label of the program of a radio station is also contained in these.

[0017] In addition, although the interleave of the FIC is not carried out, MSC is
classified into two or more CIF (common interleave frame), and an interleave is
performed. MSC is classified into much SubCh(s) (subchannel) and each SubCh
corresponds to the one above-mentioned symbol. Each above-mentioned service
component consists of each SubCh. for example, the subcomponent of an audio --
the case of speeches (conversation), such as news and a weather report, --
comparing -- a sound -- case it is easy -- the number of configurations of SubCh --
increasing -- a sound -- even when easy, in the case of a stereo, the number of
configurations of SubCh increases as compared with a monophonic recording.

[0018] Moreover, in a digital audio broadcast, with transmission modes, the
configuration of a data frame changes, as shown in the following table.

[0019]

[A table 1]



[0020] Drawing 6 is drawing showing the example of a configuration of SubCh of drawing 5 . As shown in this Fig., a header, CRC (Cyclic Redundancy Check Code), audio data, the staff (stuff) of longitudinal adjustment, X-PAD, a scale factor (SCF) CRC, and F-PAD are prepared in SubCh. F-PAD (program associated data) is data concerning dynamic range control of SubCh here, as the topic contained in X-PAD (program associated data) at SubCh -- a sound -- there are data of content approximate accounts, such as an easy music name, a singer name, and incident names (a robbery incident name, sport name, etc.) of news.

[0021] Next, a control section 11 will begin to register into the storage section 12 the number information acquired from the FIC analysis section 111, if the carbon button of program registration of a radio station is pushed by the display of the display control unit 14 as shown in drawing 3 . Drawing 7 is drawing explaining the example of initial condition setting out in program automatic selection mode. If the carbon button with which the lower part of drawing 3 progresses is pushed, the display for initial condition setting out in the program automatic selection mode shown in this Fig. will appear in the display control unit 14. The carbon button of advice on/off, the carbon button of auto-output on/off, the carbon button of priority setting-out on/off, the carbon button of return on/off, and the carbon button of reset on/off are shown in this display. These on/off carbon buttons are pushed according to liking.

[0022] A control section 11 makes a beep sound output at every initiation of a registration program, when the carbon button of advice on/off is on. A control section 11 is switched to the radio station which is broadcasting this registration program, when a program which is different when the carbon button of auto-output on/off is on is heard and broadcast of a registration program is started. A control section 11 is switched to the radio station which is broadcasting the high registration program of priority, when the carbon button of priority setting-out on/off is on and two or more registration programs are broadcast at this time of day. A control section 11 is returned to the broadcasting station which was broadcasting the original program from the termination program after termination of the selected registration program, when the carbon button of return on/off is on. A control section 11 switches the carbon button set as on to off, when the carbon button of reset on/off is on. Furthermore, a control section 11 forbids the above actuation, when the above carbon button is off.

[0023] Drawing 8 is drawing explaining a registration program and its priority. The program asked to the storage section 12 now whenever the carbon button of program registration of a radio station is pushed by the display control unit 14 shown in drawing 3 , as shown in the left-hand side of this Fig. is registered and accumulated. And a control section 11 searches these registration programs with the program of two or more services which are carrying out current reception, and makes the program of the service corresponding to the searched registration program (for example, "program 2" in drawing) choose and output in it. the program of the radio stations a, b, c, d, e, and f which are specifically doing current reception of the retrieval of a control section 11 -- a0 and b -- 0, c0, d0, e0, and f0 Registration programs 1 and 2 -- It is referred to as n and is a program a0, b0, c0, d0, e0, and f0 Any one is the registration programs 1 and 2. -- It searches whether it is in agreement with any one of the n, for example, is a program a0. If in agreement with the registration program 2, it will be a program a0. It is outputted.

[0024] When the carbon button of priority setting-out on/off of drawing 7 is turned on [it], the display control unit 14 displays a registration program like the right of drawing 8 , and indicates the registration program (k, p) of this time of day by flash, and makes a user attach priority to a registration number. In this case, suppose that the priority of Program k is set by the 1st place, and the priority of Program p is set as the 2nd place. A control section 11 makes the program corresponding to a registration program (program k) with high priority output, when there are a retrieval result or two corresponding registration programs or more. In addition, you may make it choose a program as a two or more program owner ** case manually at this time of day by the case where this setting out is off.

[0025] Drawing 9 is a flow chart explaining a series of actuation of a control section 11. As shown in this Fig., in step S1, a control section 11 carries out the monitor of the initialization conditions of the carbon button of advice on/off in the display control unit 14, the carbon button of auto-output on/off, the carbon button of priority setting-out on/off, the carbon button of return on/off, and the carbon button of reset on/off.

[0026] In step S2, a control section 11 inputs the program information on a character string from the analysis result of the FIC analysis section 111. In step S3, if whether a registration program is included in the program which is carrying out current reception searches a control section 11 and it is not contained, it progresses to step S4. In step S4 and 5, it judges whether the program heard now is liking of a user, if it is liking, it will register, and a registration program is accumulated. When a control section 11 has the carbon button of the program registration of a radio station shown in drawing 3 pushed, it judges the program heard now to be a favorite program, and makes this program register into the storage section 12. In addition, as long as the program heard now is not liking, in drawing 3 , the carbon button of other services (radio station) may be pushed, and a favorite program may be looked for.

[0027] Step S In 6 and 7, a control section 11 will reset the program registered into the Records Department 12 at step S5, if the carbon button of reset on/off is on. Also when liking of a user changes or the user itself changes by this, initial condition setting out can newly be performed, and a response becomes possible flexibly. Step S In 8 and 9, if in agreement in step S3, if the carbon button of advice on/off is on, a control section 11 will output a beep sound and will tell registration program initiation. Thereby, it can tell that a user's favorite program began. It is effective even if a program is delayed by a certain cause.

[0028] step S — 10 and 11 — it sets 12, and a control section 11 will output a registration program, if the carbon button of auto-output on/off is on. The actuation which a user switches manually becomes unnecessary. It is effective even if a program is delayed by a certain cause. Step S A control section 11 makes the high program of the priority decided by the user output in 13, 14, and 15, if the carbon button of priority setting-out on/off is on, when two or more favorite programs are in this time of day. Even if liking competes, the actuation which a user switches manually becomes unnecessary.

[0029] Step S In 16, 17, and 18, a control section 11 is returned to the radio station of the original program in front of an automatic change-over after registration program termination. Since it is the second best favorite radio station in many cases even if the radio station before an automatic change-over is not the best, it returns to this and manual actuation of a change-over is reduced. according to this example as mentioned above — the voice program of liking [a user] — a short time — and it becomes possible to hear it by the short check-by-looking time amount of data display, for this reason, complicated actuation becomes unnecessary, and the selection range of a user spreads.

[0030] Drawing 10 is drawing explaining another example of initial condition setting out in the program automatic selection mode in drawing 7 . If the carbon button of PAD (program associated data) information storage is pushed when displaying selection of the service in the display control unit 14 as shown in this Fig., the topic and the frequency of occurrence of X-PAD will be memorized by the storage section 12 about each of SubCh explained by drawing 5 .

[0031] Drawing 11 is drawing explaining the example of initial condition setting out in the program automatic selection mode using PAD information. If the carbon button with which the lower part of drawing 10 progresses is pushed, the display for initial condition setting out in the program automatic selection mode using the PAD information shown in this Fig. will appear in the display control unit 14. The carbon button of setting out of a time span, the carbon button of threshold setting out like a sort order, the carbon button of sort setting-out on/off, the carbon button of advice on/off, the carbon button of auto-output on/off, the carbon button of return on/off, and the carbon button of reset on/off are shown in this display. These on/off carbon buttons are pushed according to liking of a user.

[0032] Since it is the same as that of explanation of drawing 7, explanation of the carbon button of advice on/off, the carbon button of auto-output on/off, the carbon button of return on/off, and the carbon button of reset on/off is omitted. Drawing 12 is drawing explaining the example of setting out of time SUPAN of drawing 11. If the carbon button of setting out of time SUPAN is pushed in drawing 11, the display of setting out of a time span shown in this Fig. will appear in the display control unit 14. In this display, time SUPAN could be set up per a Japanese unit, a week unit, and moon, for example, and time SUPAN is set as two weeks in this example.

[0033] Drawing 13 is drawing explaining the example of threshold setting out like a sort order. If Botha-N of threshold setting out like a sort order is pushed in drawing 11, the display of threshold setting out like the sort order shown in this Fig. will appear in the display control unit 14. The threshold like a sort order is a threshold which chooses the topic of the high order of the frequency of occurrence of the topic which appears in PAD. In this example, the threshold was set to 5 and it has extracted to the topic of five high orders.

[0034] Drawing 14 is drawing explaining the frequency of occurrence of a topic. When the carbon button of PAD information storage is pushed by the display of the display control unit 14 of drawing 10, a control section 11 inputs the PAD information on a character string from the PAD analysis section 112, and the storage section 12 is made to memorize it as a topic, and it makes the frequency of occurrence of a topic memorize, as shown in drawing 14 within set-up time SUPAN. Drawing 15 is drawing explaining the example of a sort of a topic. As shown in this Fig. (a), in the display control unit 14, at least an appearance order is attached to the topic and topic of the storage section 12 based on the frequency of occurrence. If the carbon button of sort setting out is pushed by the display control unit 14 of drawing 11, as shown in this Fig. (b), it will be based at least on an appearance order and a topic will be sorted. If the carbon button of threshold setting out like a sort order is furthermore pushed by the display control unit 14 of drawing 11, as shown in drawing 15 (b), the topic beyond a threshold will be chosen. This selected topic is used for retrieval of the program of a control section 11. That is, when there is a program which is in agreement with the selected topic, even while hearing other programs, it is switched to the program corresponding to the selected topic. Moreover, a threshold is prepared in the ranking of the sorted topic and because priority is given to current top information and it can be heard, it extracts to the topic of the frequency of occurrence of a high order. Moreover, it is for avoiding that a program switches frequently by the low-ranking topic.

[0035] Drawing 16 is a flow chart explaining another actuation of a single string of a control section 11. it is shown in this Fig. -- as -- step S -- 21 and 22 -- step S of drawing 9 -- it is the same as that of 1 and 2. In step S23, the PAD analysis section 112 of a control section 11 performs analysis which inputs the PAD information on a character string and extracts a topic. In step S24, it judges whether the topic of the

program which is carrying out current reception, and the sorted topic of a control section 11 correspond, and if not in agreement, it progresses to step S25.

[0036] Step S A control section 11 makes the storage section 12 memorize the topic in a time span in 25, 26, and 27. In the storage section 12, the topic which the sort was performed based on the frequency of occurrence, and was sorted in the topic is extracted to a high order topic. Thereby, recently is good and programs, such as this music (music name) and news, are chosen preferentially. step S -- 29 and 30 -- step S of drawing 9 -- it is the same as that of 6 and 7.

[0037] Steps 31, 32, 33, 34, 35, 38, 39, and 40 are the same as that of step S8 of drawing 9, and 9, 10, 11, 12, 16, 17 and 18. Step S In 36 and 37, it judges whether it is higher than the ranking of the topic by which the current topic was sorted, and if high, the program of the topic of high ranking will be outputted. For example, if the program of the sport B of the 4th place of the current frequency of occurrence is heard and the program of the music name A of the 1st place of the frequency of occurrence starts, it will switch to this program. Thus, the actuation which a user switches manually although the high program of a topic is chosen becomes unnecessary.

[0038] the latest voice program with the frequency of occurrence high as a result -- a short time -- and it becomes possible to hear it by the short check-by-look time amount of data display, for this reason, complicated actuation becomes unnecessary, and the selection range of a user spreads. Drawing 17 is drawing explaining another example of a sort of a topic. As shown in this Fig., in the storage section 12, the sort of a topic is performed by the control section 14 to every radio station a, b, c, d, and e and f, and the sorted topic is extracted to the thing of the high order of the frequency of occurrence. Thus, the topic extracted for every radio station is used in order to judge whether the ranking of the topic of the program of other radio stations is higher than the ranking of the topic of the program of a radio station heard now and to switch to the high radio station of ranking. For example, program a4 of current radio station a Hearing it, it is a program b2 at other radio station b. It starts and is a program b2. At least an appearance order is a program a4. When high, it is a program b2. It switches.

[0039] Drawing 18 is a flow chart explaining the sort of the topic of drawing 17. differing from drawing 16, as shown in this Fig. -- step S -- 57, 58, and step S -- it is 66 and 67 and other steps are the same. Step S In 57 and 58, in the storage section 12, a sort is performed for every radio station and the topic of a high order is extracted for every radio station.

[0040] Step S In 66 and 67, rather than a current topic, a control section 11 judges whether the topic of other radio stations is in high ranking, and outputs the program of the radio station of the high topic of ranking. Thus, even if it chooses the program of a high topic for every radio station, and it chooses the program of a high topic as mentioned above in the whole radio station, the same operation effectiveness can be acquired.

[0041]

[Effect of the Invention] A favorite program comes to be automatically acquired using the program information which is included in FIC information by the above explanation according to this invention, actuation becomes very easy, a program with the high frequency of occurrence of the topic of the program further included in PAD information can be automatically acquired now, and it becomes possible to get to know what is top information now.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing explaining the receiver of the digital audio broadcast concerning this invention.

[Drawing 2] It is drawing explaining the example of actuation of selection of the ensemble in the display control unit 14.

[Drawing 3] It is drawing explaining the example of actuation of selection of the service in the display control unit 14.

[Drawing 4] It is drawing explaining the ensemble received.

[Drawing 5] It is drawing showing the related example of the service and the data frame of a digital audio broadcast.

[Drawing 6] It is drawing showing the example of a configuration of SubCh of drawing 5.

[Drawing 7] It is drawing explaining the example of initial condition setting out in program automatic selection mode.

[Drawing 8] It is drawing explaining the priority of a registration program.

[Drawing 9] It is a flow chart explaining a series of actuation of a control section 11.

[Drawing 10] It is drawing explaining another example of initial condition setting out in the program automatic selection mode in drawing 7.

[Drawing 11] It is drawing explaining the example of initial condition setting out in the program automatic selection mode using PAD information.

[Drawing 12] It is drawing explaining the example of setting out of time SUPAN of drawing 11.

[Drawing 13] It is drawing explaining the example of threshold setting out like a sort order.

[Drawing 14] It is drawing explaining the frequency of occurrence of a topic.

[Drawing 15] It is drawing explaining the example of a sort of a topic.

[Drawing 16] It is a flow chart explaining another actuation of a single string of a control section 11.

[Drawing 17] It is drawing explaining another example of a sort of a topic.

[Drawing 18] It is a flow chart explaining the sort of the topic of drawing 17 .

[Description of Notations]

5 --- Channel decoding section

8 --- Adder unit

11 --- Control section

12 --- Storage section

13 --- Beep sound formation section

14 --- Display control unit

51 --- Decoding/selection section

52 --- FIC decoding section

111 --- FIC analysis section

112 --- PAD analysis section
